Sun SPARC® Enterprise M4000/M5000 Servers Site Planning Guide

Sun Microsystems, Inc.
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Preface

This site planning guide describes the physical, environmental, and electrical specification requirements of the Sun SPARC® Enterprise M4000/M5000 midrange servers. References herein to the SPARC Enterprise M4000 server are references to the Sun SPARC Enterprise M4000 server. References herein to the SPARC Enterprise M5000 server are references to the Sun SPARC Enterprise M5000 server.

Due to the amount of time required to plan and properly prepare a site for installation of these midrange servers, you must fulfill all of the requirements outlined in this manual before your equipment arrives. Your Sun Microsystems authorized service provider (ASP) is available to help.

How This Document Is Organized

This book is organized in two chapters:

Chapter 1 provides a worksheet for planning your space. It also discusses server specifications and network connections.

Chapter 2 discusses environmental requirements, electrical and cooling specifications, and thermal guidelines.

Related Documentation

The documents listed as online are available at:

http://www.sun.com/products-n-solutions/hardware/docs/

Application	Title	Format	Location
Installation	*Sun SPARC Enterprise M4000/M5000 Servers Installation Guide*	Printed PDF	Shipping kit Online
Site Planning	*Sun SPARC Enterprise Equipment Rack Mounting Guide*	PDF HTML	Online
Service	*Sun SPARC Enterprise M4000/M5000 Servers Service Manual*	PDF	Online
Overview	*Sun SPARC Enterprise M4000/M5000 Servers Overview Guide*	PDF HTML	Online
Getting Started	*Sun SPARC Enterprise M4000/M5000 Servers Getting Started Guide*	Printed PDF	Shipping kit Online
Safety/Compliance	*Sun SPARC Enterprise M4000/M5000 Servers Safety and Compliance Manual*	Printed PDF	Shipping kit Online

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Sun SPARC Enterprise M4000/M5000 Servers Site Planning Guide, part number 819-2205-10

CHAPTER 1

Physical and Network Specifications

The chapter contains the following sections:

- Section 1.1, "Before Setting Up the Server" on page 1-1
- Section 1.2, "Server Specifications" on page 1-3

1.1 Before Setting Up the Server

Prior to server installation, confirm that the requirements in TABLE 1-1 have been met.

TABLE 1-1 Preinstallation Requirements

	Checklist	Check
Server Components	• Has the server configuration been determined?	
	• What is the total number of servers?	
Training	• Have system administrators and operators taken the necessary training courses?	
Environmental	• Does the computer room environment meet the temperature and humidity specifications (Section 2.3, "Airflow and Heat Dissipation" on page 2-5)?	
	• Can the computer room environment specifications be maintained satisfactorily?	
	• Is the computer room secured?	
	• Is additional fire suppression equipment required?	

TABLE 1-1 Preinstallation Requirements *(Continued)*

	Checklist	Check
Facility Power	• Have you determined voltage for server equipment rack and peripheral equipment racks?	
	• Have sufficient power receptacles been ordered for each server, monitor, and peripheral?	
	• Are the power receptacles within 3.5 meters (11.5 feet) of the equipment rack?	
Physical Specifications	• Has the server location been established?	
	• Does the equipment floor layout meet the equipment maintenance access requirements (Section 1.2.2.1, "Size and Space Specifications" on page 1-6)?	
	• Will the equipment be positioned so that the exhaust air of one device does not enter the air inlet of another?	
Access Route	• Has the access route been checked for clearances of the packaged server (Section 1.2.3, "Access Route" on page 1-8)?	
	• Has a proper pallet jack been checked for weight limitation for moving the server (Section 1.2.3, "Access Route" on page 1-8)?	
	• Has the elevator been checked for clearances and weight restrictions of the packaged server (Section 1.2.3, "Access Route" on page 1-8)?	
Network Specification	• Have you determined necessary information for your network connections (Section 1.2.5, "Network Connection" on page 1-9)?	

1.2 Server Specifications

This section provides information about the physical characteristics of both midrange servers, including dimensions, space needs, cable sizes, and limitations.

1.2.1 Server Components

FIGURE 1-1 illustrates the SPARC Enterprise M4000 server.

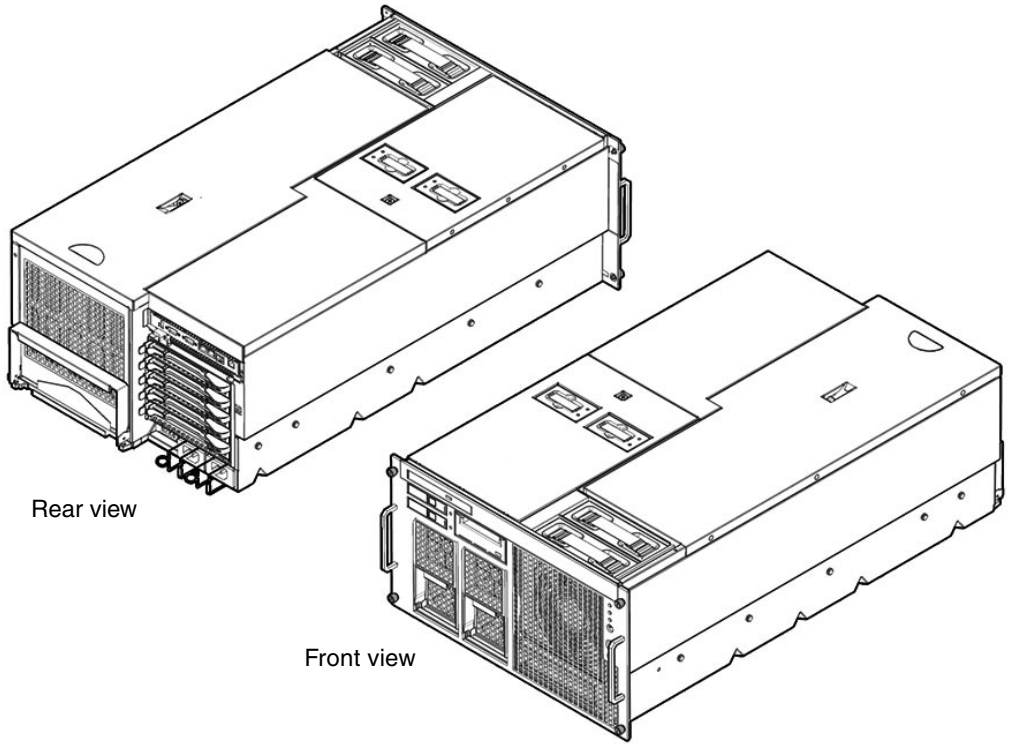

FIGURE 1-1 SPARC Enterprise M4000 Server (Rear and Front Views)

FIGURE 1-2 illustrates the SPARC Enterprise M5000 server.

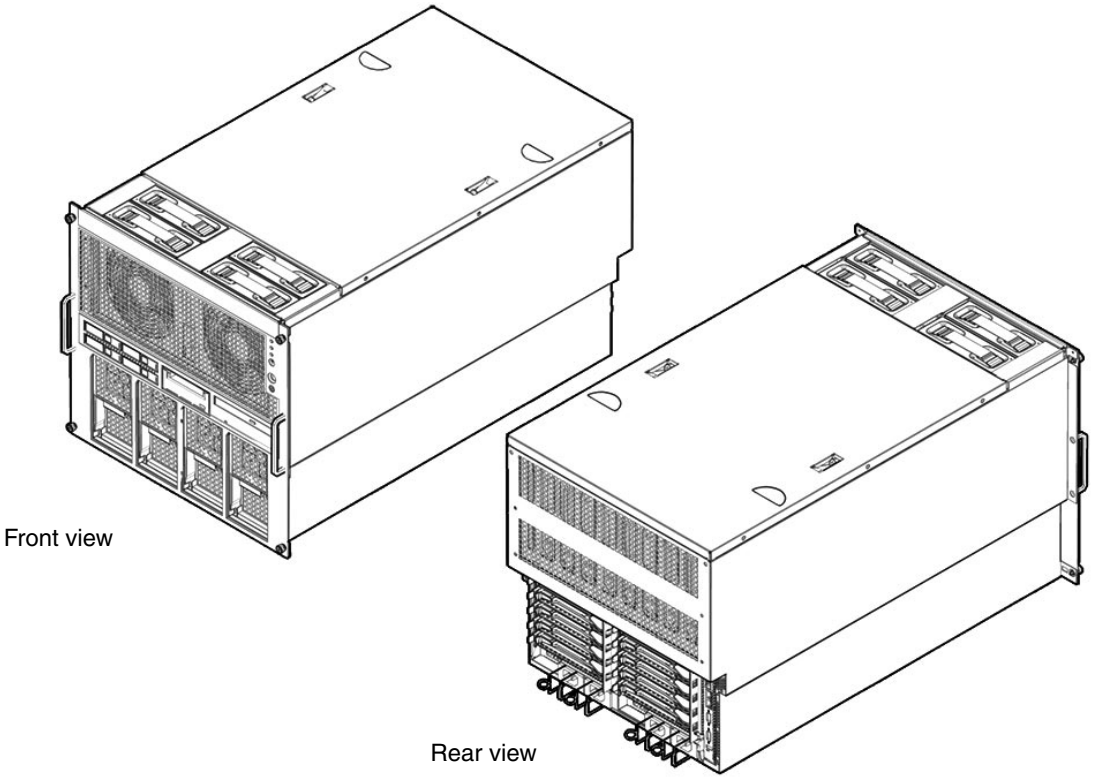

FIGURE 1-2 SPARC Enterprise M5000 Server (Front and Rear Views)

TABLE 1-2 lists the maximum configurations for midrange servers.

TABLE 1-2 Components for Midrange Servers

Component	SPARC Enterprise M4000 Server	SPARC Enterprise M5000 Server
Power supply units	2	4
eXtended System Control Facility Unit (XSCFU)	1	1
Fans	4	4
Motherboard unit	1	1

TABLE 1-2 Components for Midrange Servers *(Continued)*

Component	SPARC Enterprise M4000 Server	SPARC Enterprise M5000 Server
CPU Modules	2	4
• CPU chips (SPARC64 VI)	4	8
Memory boards	4	8
• Memory module	32	64
I/O unit	1	2
• PCI-Express cassettes	4	8
• PCI-X cassette	1	2
DVD	1	1
Hard disk drive	2	4
Tape drive unit (optional)	1	1

1.2.1.1 Mounting Requirements

Both midrange servers are designed to be mounted in qualified equipment racks. For more detail on mounting requirements, refer to the *SPARC Enterprise Equipment Rack Mounting Guide.*

1.2.2 Server Guidelines

As you plan your space needs for these midrange servers in qualified equipment racks, keep these conditions in mind:

- *Each* midrange server requires its own power cords, connected to separate power outlets. See Chapter 2, "Environmental and Electrical Specifications" for details on electrical requirements.
- Circuit breakers are supplied by the customer as required by local, state, or national electrical codes.
- Both midrange servers require electrical circuits that are grounded to earth.

Refer to the *SPARC Enterprise M4000/M5000 Servers Installation Guide* for complete installation details and the *SPARC Enterprise Equipment Rack Mounting Guide* for mounting requirements.

1.2.2.1 Size and Space Specifications

For maintenance access, refer to the *SPARC Enterprise Equipment Rack Mounting Guide* for exact measurements.

FIGURE 1-3 shows an example of the maintenance access area for midrange servers in a qualified equipment rack.

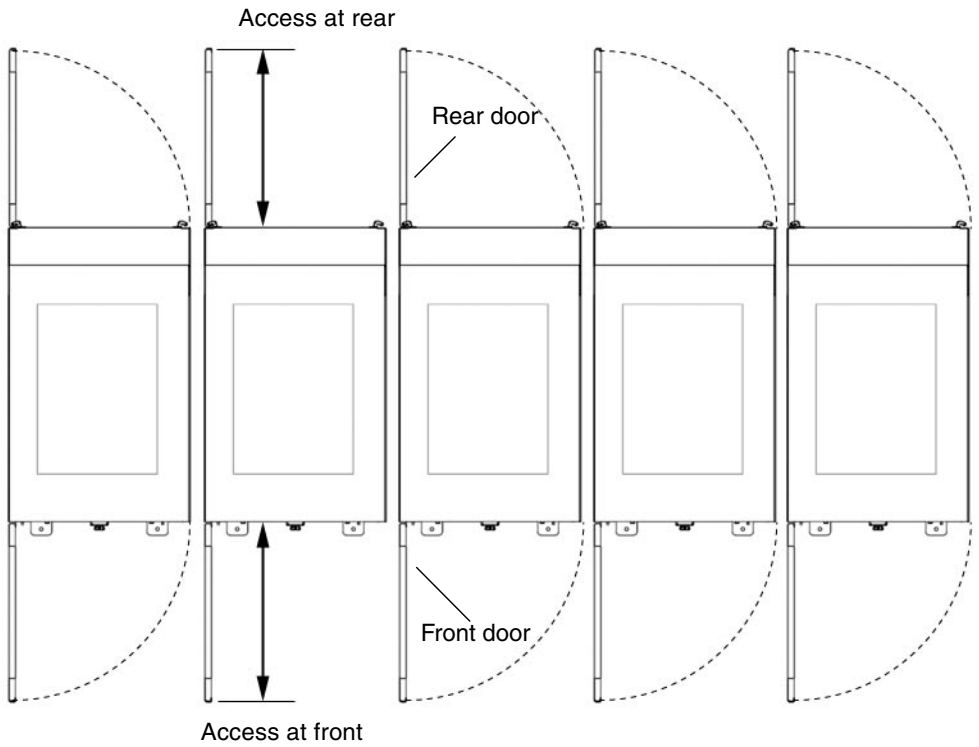

FIGURE 1-3 Example of the Front and Rear Maintenance Access Areas for Equipment Racks (Top View)

TABLE 1-3 Midrange Servers Physical Specifications

Characteristic	SPARC Enterprise M4000 Server	SPARC Enterprise M5000 Server
Shipping height (package on wooden pallet)	709 mm/27.9 in.	886 mm/34.9 in.
Shipping width (package on wooden pallet)	600 mm/23.6 in.	600 mm/23.6 in.
Shipping depth (package on wooden pallet)	1016 mm/40 in.	1016 mm/40 in.
Shipping weight (package on wooden pallet)	99 kg/219 lb	149 kg/329 lb
Height	263 mm/10.3 in.	440 mm/17.3 in.
Width	444 mm/17.5 in.	444 mm/17.5 in.
Depth	831 mm/32.7 in.	816 mm/32.1 in.
Weight	84 kg/185 lb	125 kg/275 lb
Power cord length	4m/13 ft	4m/13 ft

FIGURE 1-4 illustrates midrange servers shipping crate dimensions.

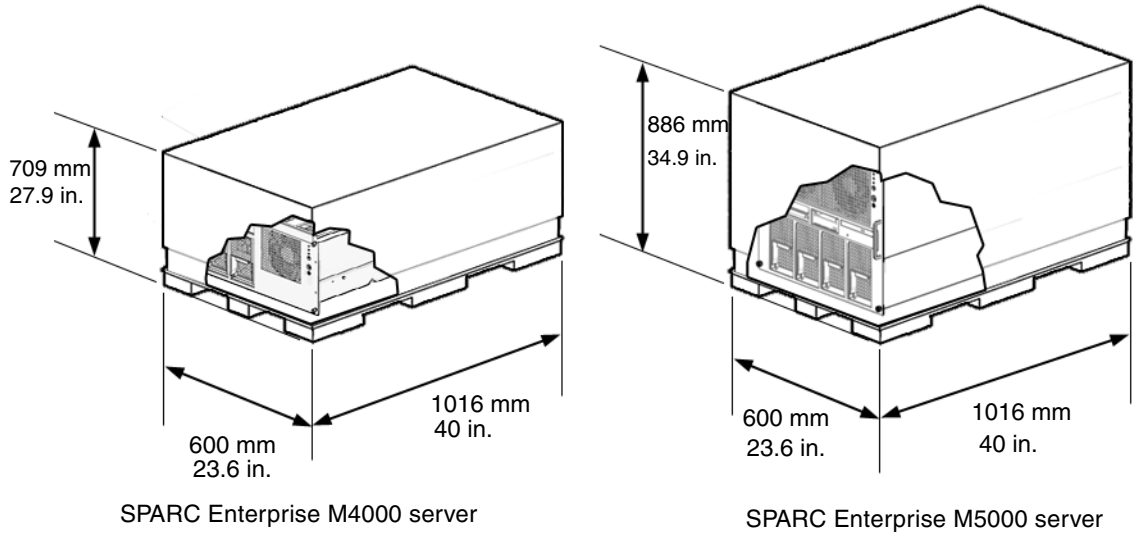

FIGURE 1-4 Midrange Servers in Shipping Crates

1.2.2.2 Space for Thermal Clearance

Both midrange servers must maintain the minimum thermal distance between the rear of the server in an equipment rack, and any obstructions or walls. For thermal clearance requirements during operation, refer to the *SPARC Enterprise Equipment Rack Mounting Guide*.

1.2.3 Access Route

If your existing loading dock meets height or ramp requirements for a standard freight carrier truck, you can use a pallet jack to unload the server. If not, you must provide a standard forklift or other means to unload the server, or request the server be shipped in a truck with a lift gate.

All servers not shipped in an equipment rack should be lifted only by proper computer-lifting equipment to prevent personal injury or damage to system equipment.

Each server that is not preinstalled in an equipment rack is shipped in a separate crate. A pallet jack is required to move each shipping crate to the server location.

Leave each server in its shipping crate until it reaches its final destination. If the crate does not fit through the planned access route, partially disassemble it.

The entire access route to your computer room should be free of raised patterns that can cause vibration. The route must meet the following requirements:

- Minimum door height
- Minimum elevator depth
- Maximum incline of 10 degrees
- Minimum elevator, pallet jack, and floor loading capacity

Refer to the *SPARC Enterprise Equipment Rack Mounting Guide* for specific requirements for your equipment rack.

1.2.4 Stabilizing the Rack

Equipment racks can be permanently mounted to the floor. For more information on stabilizing the equipment rack, refer to the *SPARC Enterprise Equipment Rack Mounting Guide*.

1.2.5 Network Connection

This section provides an overview of the midrange servers network setup for server startup and network connections. For more information on network connection, refer to the *SPARC Enterprise M4000/M5000 Servers Installation Guide*.

1.2.5.1 Setup and Network Connection

The serial port on the eXtended System Control Facility Unit (XSCFU) is used to monitor the boot process and to modify the XSCFU network settings so that the local area network (LAN) ports can be used to connect to a system administrative network.

An administrative network is a secure LAN that connects the XSCFU to the system administrator's management console. This connection can be done directly but is usually done through a hub or switch specific to the system control network. Administration directly over the serial port is used to initially configure the LAN ports.

The following network connections must be available:

- One serial console connection:
  - Baud rate: 9600 bps
  - Data length: 8 bit
  - Parity: None
  - Stop: 1 bit
  - Flow control: None
  - Delay: Except for 0
- Two 10/100BASE-T Ethernet ports
- One 10/100BASE-T Ethernet connection per domain

1.2.5.2 Platform and Domain Setup

The following information is required when installing midrange servers:

- For any platform:
  - Netmask
  - Gateway
  - DNS Domain
  - Loghost
- For each service processor and each domain:
  - Host name

1.2.5.3 Choosing the System Control Network Configuration

In determining the system control network configuration, consider the following:

- The IP address of each LAN port can be assigned in compliance with the existing environment and modified from the default Class-B private address.
- Customer may use a dual- or single-power feed option.
- Customer may segregate the LAN port or network for access by field engineers. Or field engineer access may be through the serial port in the event that maintenance is required.

There are three common system control network configurations depending upon the site requirements:

- Configuration A (Basic)
- Configuration B (Limited)
- Configuration C (Maximum)

Configuration A (Basic) – Only one of the two LAN ports is used, leaving the serial port and the other LAN port for use as maintenance ports. The same switch is used for system administration and remote services, so switch failure means system control network failure.

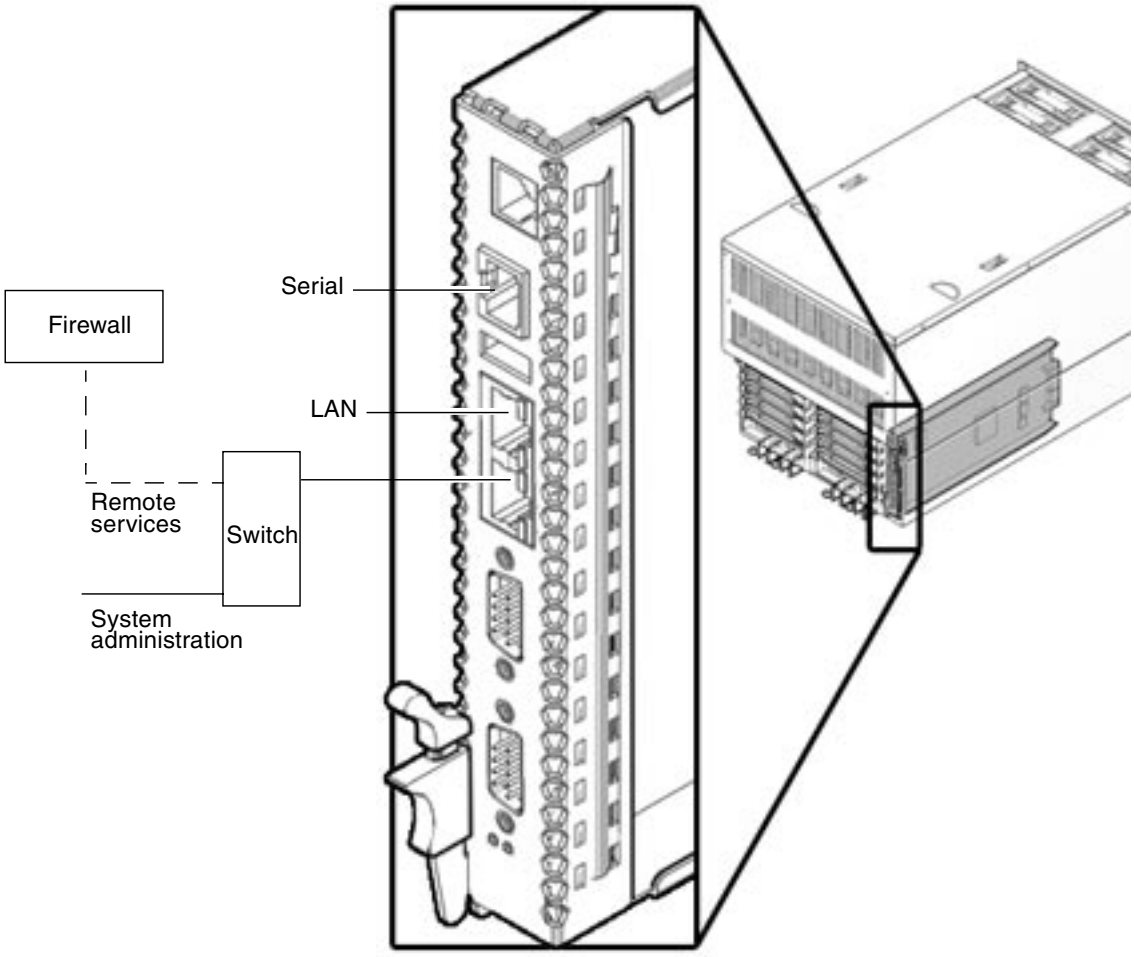

FIGURE 1-5 Configuration A (Basic)

Configuration B (Limited Redundancy) – Both LAN ports are used, one for system administration and the second for remote messaging. If one switch goes down, errors can still be reported. The serial port and a port on the remote services switch are available as maintenance ports.

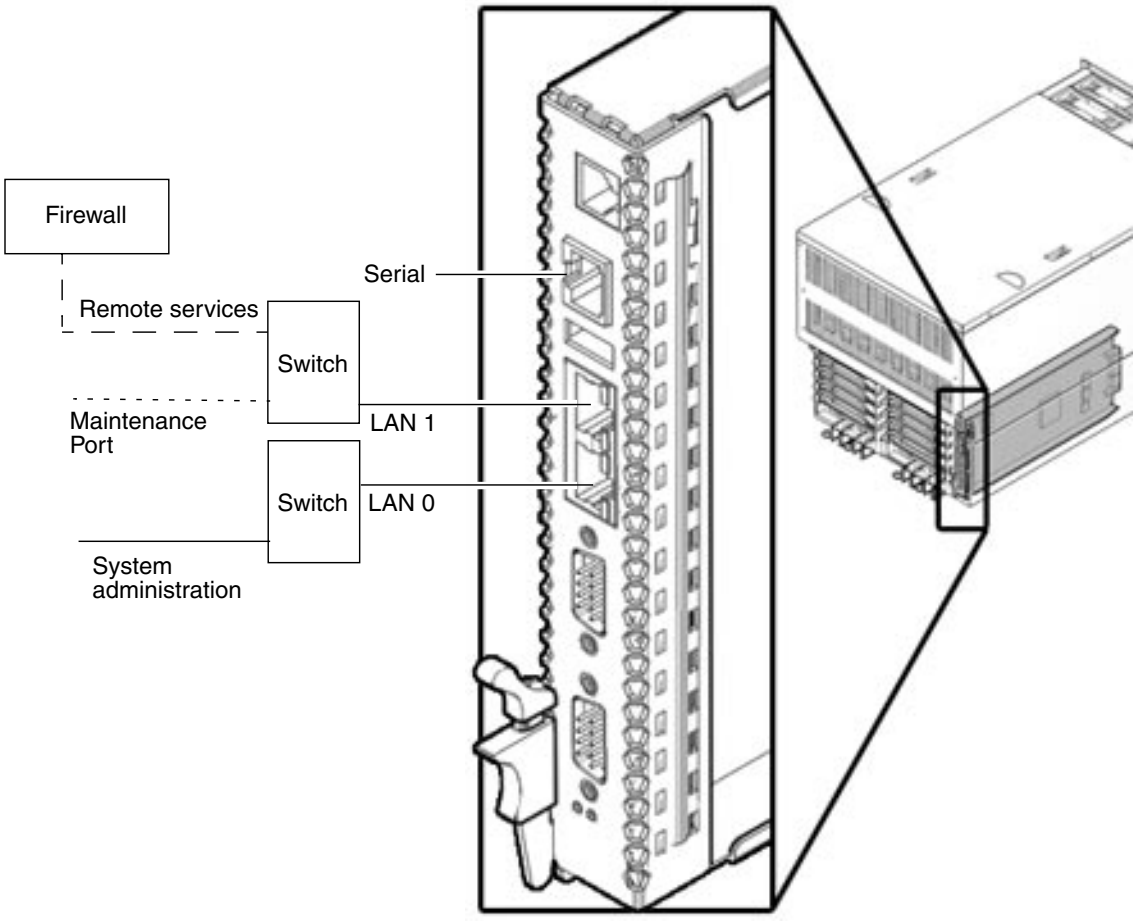

FIGURE 1-6 Configuration B (Limited Redundancy)

Configuration C (Maximum Redundancy) – Both LAN ports are used and each switch has a maintenance port that is connected to remote services, system administration. A failed switch causes no interruption in the system control network.

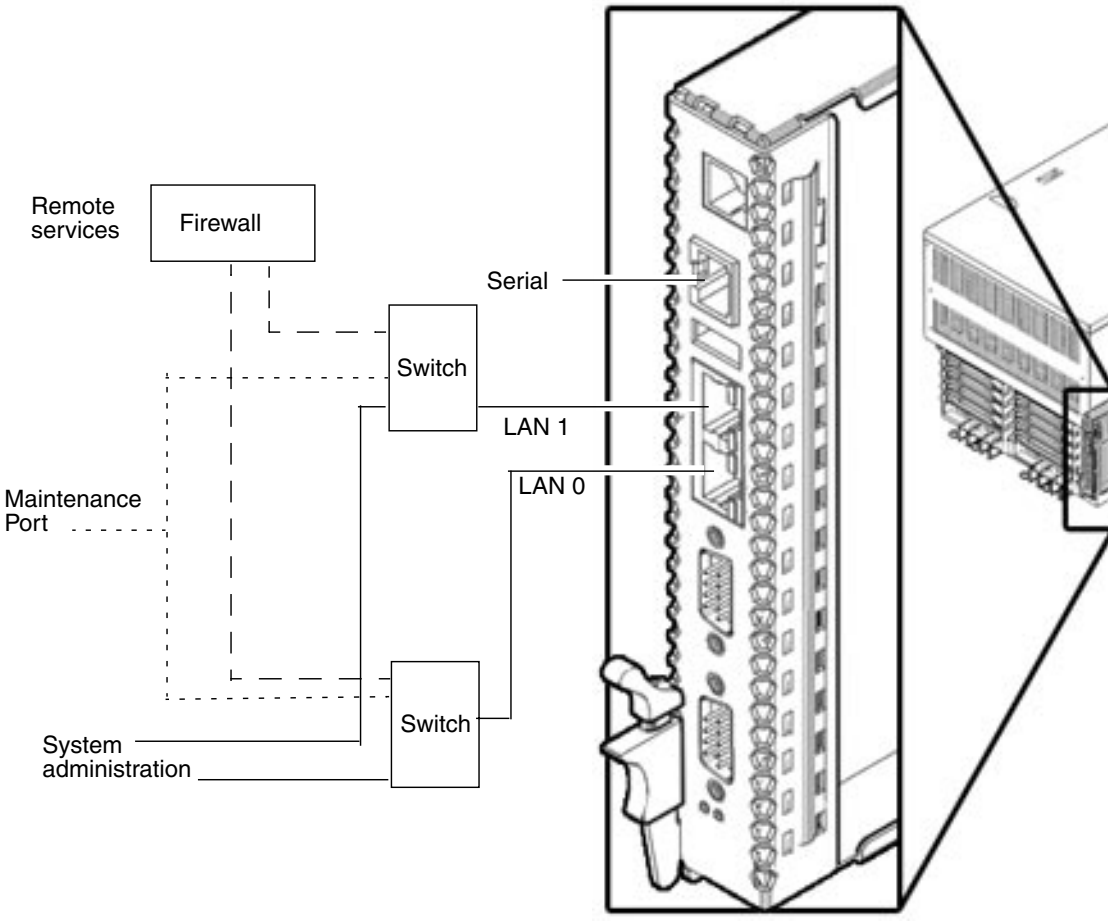

FIGURE 1-7 Configuration C (Maximum Redundancy)

For more information on connecting to a console, refer to the *SPARC Enterprise M4000/M5000 Servers Installation Guide* for your product.

CHAPTER 2

Environmental and Electrical Specifications

This chapter contains the environmental and electrical specifications for the midrange servers.

- Section 2.1, "Environmental Requirements" on page 2-1
- Section 2.2, "Electrical and Cooling Specifications" on page 2-3
- Section 2.3, "Airflow and Heat Dissipation" on page 2-5
- Section 2.4, "Facility Power Requirement" on page 2-6

2.1 Environmental Requirements

Both midrange servers can be installed in an environment with the operating ranges shown in TABLE 2-1.

The design of your environmental control system—such as computer room air-conditioning units—must ensure that intake air to the servers complies with the limits specified in this section.

To avoid overheating:

- Guard against directing any warm air toward the front of the equipment rack.
- Guard against directing warm air toward the server access panels.

TABLE 2-1 Environmental Ranges

Environmental Factor	Operating Range	Non-Operating Range	Optimum
Ambient temperature*	5˚C to 35˚C (41˚F to 95˚F)	-20˚C to 60˚C* (-4˚F to 140˚F)	21˚C to 23˚C (70˚F to 74˚F)
Relative humidity	20% RH to 80% RH, noncondensing	up to 93% RH, noncondensing	45% RH to 50% RH, noncondensing
Elevation	3000 m (10,000 ft)	12,000 m (40,000 ft)	

* derated 2˚C for every 1 km up to 3 km

The operating environmental ranges in TABLE 2-1 reflect server testing. The optimum condition is the suggested operating environment. Operating computer equipment for extended periods at or near the temperature or humidity extremes is known to significantly increase the failure rate of hardware components.

Note – In order to minimize any chance of downtime due to component failure, use the optimal temperature and humidity ranges.

2.1.1 Ambient Temperature

The ambient temperature range of 21°C to 23°C (70°F to 74°F) is optimal for server reliability and operator comfort levels. Most computer equipment can operate within a wide temperature range, but a level near 22°C (72°F) is desirable because it is easier to maintain safe associated relative humidity levels at this temperature. Operating in this temperature range provides a safety buffer in the event the air conditioning systems go down for a period of time.

2.1.2 Ambient Relative Humidity

Ambient relative humidity levels between 45 percent and 50 percent are the most suitable for safe data processing operations. Most data processing equipment can operate within a fairly wide environmental range (20 percent to 80 percent), but the optimal goal should be between 45 percent to 50 percent for the following reasons:

- Optimal range helps protect computer systems from corrosivity problems associated with high humidity levels.
- Optimal range provides the greatest operating time buffer in the event of an air conditioner control failure.
- This range helps avoid failures or temporary malfunctions caused by intermittent interference from static discharges that might occur when relative humidity is too low.

Electrostatic discharge (ESD) is easily generated and less easily dissipated in areas where the relative humidity is below 35 percent. ESD becomes critical when humidity levels drop below 30 percent. The 5 percent relative humidity range might seem unreasonably tight when compared to the guidelines used in typical office environments or other loosely controlled areas. However, it is not as difficult to maintain in a data center because of the high efficiency vapor barrier and low rate of air changes normally present.

2.2 Electrical and Cooling Specifications

This section provides guidelines and requirements for cooling the midrange servers. See TABLE 2-2 for the electrical and cooling specifications.

Be aware of the following server cooling rules and guidelines:

- The room should have sufficient air-conditioning capacity to support the cooling needs of the entire server.
- The air-conditioning system should have controls that prevent excessive temperature changes.

Note – The power numbers in TABLE 2-2 are maximums and are based on fully configured servers. Actual numbers might vary according to your server configuration.

TABLE 2-2 Midrange Servers Electrical Specifications

	SPARC Enterprise M4000	SPARC Enterprise M5000
Number of Power Cords	2 (1 power cord per power supply unit)	4 (1 power cord per power supply unit)
Redundancy	1 + 1 redundant Second power supply is redundant at 200 VAC	2 + 2 redundant Second and fourth power supplies are redundant at 200 VAC
Input voltage	100–127 VAC 200–240 VAC	100–127 VAC 200–240 VAC
Maximum current	24.0A at 100–127 VAC (12A/cord) 12.0A at 200–240 VAC (12A/cord)	48A at 100–127 VAC (12A/cord) 24A at 200–240 VAC (12A/cord)
Frequency	50–60 Hz	50–60 Hz
Power draw (maximum)	2350W (2 power cords)	4590W (4 power cords)
Volt Ampere	2397 VA	4684 VA
Heat dissipation	8018 Btu/hr (8459 kJ/hr)	15661 Btu/hr (16523 kJ/hr)
Power factor	0.98	0.98
Connector type	IEC 60320 C19	IEC 60320 C19
Plug type	IEC 60320 C20 IEC 60309 16A 250V (All other locations except Japan and Taiwan) NEMA L5-15 125V 15A (Americas, Japan, and Taiwan) NEMA L6-20 250V 20A (Americas, Japan, and Taiwan)	IEC 60320 C20 IEC 60309 16A 250V (All other locations except Japan and Taiwan) NEMA L5-15 125V 15A (Americas, Japan, and Taiwan) NEMA L6-20 250V 20A, Americas, Japan, and Taiwan)

2.3 Airflow and Heat Dissipation

The maximum rate of heat release from fully configured midrange servers is listed in TABLE 2-3.

TABLE 2-3 Heat Dissipation

Server	Configuration	Heat Dissipation
SPARC Enterprise M4000	2 CPU modules, 128 Gbytes memory	8018 Btu/hr (8459 kJ/hr)
SPARC Enterprise M5000	4 CPU modules, 256 Gbytes memory	15661 Btu/hr (16523 kJ/hr)

Both midrange servers have been designed to function while mounted in a natural convection airflow. The following rules must be followed to meet the environmental specification.

- Ensure adequate airflow through the server.
  - The SPARC Enterprise M4000 server uses internal fans that can achieve a total airflow of 300 cubic feet of air per minute (cfm)/8.5 cubic meter per minute in normal operating conditions.
  - The SPARC Enterprise M5000 server uses internal fans that can achieve a total airflow of 600 cfm/ 16.99 cubic meter per minute in normal operating conditions.
- The server has front-to-back cooling. The air inlet is at the front of the server. The exhaust exits from the rear of the server.
- Allow a minimum clearance of 36 inches (914 mm) at the front and 914 mm (36 inches) at the rear of the server for adequate ventilation.

Ensure that additional equipment installed in the equipment rack does not exceed environmental limits at the air inlet. The environmental limits assume the server is operating in the equipment rack with ventilated doors closed.

2.4 Facility Power Requirement

To prevent catastrophic failures, the design of your power system must ensure that adequate power is provided to your midrange servers. Use dedicated AC breaker panels for all power circuits that supply power to your server. Electrical work and installations must comply with applicable local, state, or national electrical codes.

2.4.1 Circuit Breaker Capacity and Characteristics

Qualified equipment racks housing these midrange servers require their own customer-supplied circuit breaker and AC receptacle for each power cord. Provide a stable power source, such as an uninterruptible power system (UPS), to reduce the possibility of component failures. If the computer equipment is subjected to repeated power interruptions and fluctuations, it is susceptible to a higher component failure rate than it would be with a stable power source.

Note – If the appropriate electrical receptacle is not available in your country, the connector may be removed from the cord. The cord can then be permanently connected to a dedicated branch circuit by a qualified electrician. Check local electrical codes for proper installation requirements.

2.4.2 Grounding

Both midrange servers are shipped with grounding-type (three-wire) power cords. Always connect the cords into grounded power outlets. Each power cord will also supply your server with proper earth ground.

Contact your facilities manager or a qualified electrician to determine what type of power is supplied to your building.

Glossary

A

Authorized service provider (ASP) An authorized individual who can provide service in the site planning preparations for your servers.

C

circuit breaker (CB) The component containing the switching circuit for the current breaker.

CPU board The central processing unit (CPU) board of the system containing the CPU modules.

CPU chip Central processing unit chip. A physical processor. CPU mounted large scale integration.

CPU module A module containing one or two CPU chips.

D

DIMM Dual inline memory module.

disk drive A hardware device that holds and spins a magnetic disk and reads and writes information on it.

domain A set of one or more system boards that acts as a separate system capable of booting the operating system and running an operating system independently of any other domains. Domains that share a system are characteristically independent of each other.

Each domain is based on the logical system board that is assigned to it. Further, each domain is electrically isolated into hardware partitions, which ensures that any failure in one domain does not affect the other domains in the server.

DVD drive Digital video disc drive. A drive that holds a minimum of 4.7 gigabytes of information.

E

equipment rack The expansion cabinet for the server.

eXtended system control facility (XSCF) The software that runs on the server Service Processor and provides control and monitoring functions for the server.

eXtended system control facility unit (XSCFU) The server XSCF board that contains system administration function and operates with independent processor.

H

hard disk drive (HDD) A hardware device that reads and writes information onto a rigid, spinning magnetic disk.

M

memory board (MEMB) Memory module containing DIMMs.

motherboard unit (MBU) The main board assembly to which other boards and components are connected in the SPARC Enterprise M4000 and SPARC Enterprise M5000 midrange servers.

N

non-operating temperature range The ambient temperature range to which a system might be subjected without permanent electrical or mechanical damage.

P

PCI cassette A container for a PCI card. There are two varieties: PCIe and PCI-X.

PCIe See PCI Express.

PCI Express (PCIe) A high-speed serial, point-to-point interconnect.

PCI-X A faster version of the parallel bus PCI standard. The PCI-X bus has improved protocols and a faster clock rate.

Peripheral Component Interconnect A bus standard developed by Intel Corporation.

power supply unit (PSU) Receives AC input and supplies with multiple voltages.

PSU See power supply unit.

S

Service Processor A small system, which operates with an independent processor, and directs the system start up, reconfiguration, and fault diagnosis, plus giving access to the domain(s). This is where the system management software (XSCF) runs.

SPARC Enterprise M4000 server A midrange server containing up to four CPU chips.

SPARC Enterprise M5000 server A midrange server containing up to eight CPU chips.

T

tape drive unit A tape device that reads and writes data stored on magnetic tape.

X

XSCF See eXtended System Control Facility.